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ABSTRACT

The United States Training and Employment Service General Aptitude Test Battery (GATB), first published in 1947, has been included in a continuing program of research to validate the tests against success in many different occupations. The GATB consists of 12 tests which measure nine aptitudes: General Learning Ability; Verbal Aptitude; Numerical Aptitude; Spatial Aptitude; Form Perception; Clerical Perception; Motor Coordination; Finger Dexterity; and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, and a standard deviation of 20. Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, when combined, predict job performance. Cutting scores are set only for those aptitudes which aid in predicting the performance of the job duties of the experimental sample. The GATB norms described are appropriate only for jobs with content similar to that shown in the job description presented in this report. A description of the validation sample and a personnel evaluation form are also included. (AG)

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S–427

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TM 003 089

Development of USES Aptitude Test Battery

for

Spooler Operator, Automatic

(textile) 689.886

U.S. DEPARTMENT OF LABOR
MANPOWER ADMINISTRATION

ED 068558

Technical Report on Development of USES Aptitude Test Battery

For . . . .

Spooler Operator, Automatic (textile) 689.886

S-427

(Developed in Cooperation with the
North Carolina State Employment Service)

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December 1968

FOREWORD

The United States Employment Service General Aptitude Test Battery (GATB) was first published in 1947. Since that time the GATB has been included in a continuing program of research to validate the tests against success in many different occupations. Because of its extensive research base the GATB has come to be recognized as the best validated multiple aptitude test battery in existence for use in vocational guidance.

The GATB consists of 12 tests which measure 9 aptitudes: General Learning Ability, Verbal Aptitude, Numerical Aptitude, Spatial Aptitude, Form Perception, Clerical Perception, Motor Coordination, Finger Dexterity, and Manual Dexterity. The aptitude scores are standard scores with 100 as the average for the general working population, with a standard deviation of 20.

Occupational norms are established in terms of minimum qualifying scores for each of the significant aptitude measures which, in combination, predict job performance. For any given occupation, cutting scores are set only for those aptitudes which contribute to the prediction of performance of the job duties of the experimental sample. It is important to recognize that another job might have the same job title but the job content might not be similar. The GATB norms described in this report are appropriate for use only for jobs with content similar to that shown in the job description included in this report.

Charles E. Odell

Charles E. Odell, Director
U. S. Employment Service

GATB Study #2545

Development of USES Aptitude Test Battery

For

Spooler Operator, Automatic (textile) 689.886-054

S-427

This report describes research undertaken for the purpose of developing General Aptitude Test Battery (GATB) norms for the occupation of Spooler Operator, Automatic (textile) 689.886-054. The following norms were established:

GATB Aptitudes	Minimum Acceptable GATB Scores
S - Spatial Aptitude	65
P - Form Perception	65
Q - Clerical Perception	85

RESEARCH SUMMARY

Sample:

52 female workers employed as Automatic Spooler Operators in North Carolina.

Criterion:

Supervisory ratings

Design:

Concurrent (test and criterion data were collected at approximately the same time).

Minimum aptitude requirements were determined on the basis of a job analysis and statistical analyses of aptitude mean scores, standard deviations and selective efficiencies.

Concurrent Validity:

Phi Coefficient = .35 ($P/2 < .01$)

Effectiveness of Norms:

Only 69% of the nontest-selected workers used for this study were good workers; if the workers had been test-selected with the above norms, 82% would have been good workers. 31% of the nontest-selected workers used for this study were poor workers; if the workers had been test-selected with the above norms only 18% would have been poor workers. The effectiveness of the norms is shown graphically in Table 1:

TABLE 1

Effectiveness of Norms

	Without Tests	With Tests
Good Workers	69%	82%
Poor Workers	31%	18%

SAMPLE DESCRIPTION

Size:

N = 52

Occupational Status:

Employed workers

Work Setting:

Workers were employed by Cannon Mills of Kannapolis, North Carolina.

Employer Selection Requirements:

Education: None indicated

Previous Experience: None indicated

Tests: None indicated

Other: Personal interview

Principal Activities: The job duties for each worker are comparable to those shown in the job description in the Appendix.

Minimum Experience: All workers in the sample had at least six months total job experience.

TABLE 2

Means, Standard Deviations (SD), Ranges and Pearson Product-Moment Correlations with the Criterion (r) for Age, Education and Experience.

	Mean	SD	Range	r
Age (years)	43.5	12.1	20- 64	-.205
Education (years)	9.3	1.8	6- 12	.022
Experience (months)	178.4	144.3	6-516	-.187

Experimental Test Battery

All 12 tests of the GATB, B-1002B, were administered in October, 1964.

CRITERION

The criterion data consisted of supervisory ratings of job proficiency made at approximately the same time as test data were collected. The immediate supervisor rated each worker.

Rating Scale:

Form SP-21 "Descriptive Rating Scale" was used. This scale (see Appendix) consists of nine items covering different aspects of job performance. Each item has five alternatives corresponding to different degrees of job proficiency.

Reliability:

A reliability coefficient of .85 was obtained between the initial ratings and re-ratings, indicating a significant relationship. The final criterion score consisted of the combined scores of the two ratings.

Criterion Score Distribution;

Possible Range:	18-90
Actual Range:	33-86
Mean:	68.2
Standard Deviation:	10.9

Criterion Dichotomy:

The criterion distribution was dichotomized into low and high groups by placing 31% of the sample in the low group to correspond with the percentage of workers considered unsatisfactory or marginal. Workers in the high criterion group were designated as "good workers" and those in the low group as "poor workers". The criterion critical score is 64.

APTITUDE CONSIDERED FOR INCLUSION IN THE NORMS

Aptitudes were selected for tryout in the norms on the basis of a qualitative analysis of job duties involved and a statistical analysis of test and criterion data. Aptitudes S and P which do not have high correlations with the criterion were considered for inclusion in the norms because the sample had relatively high mean scores on these aptitudes, aptitude S had a relatively low standard deviation, and qualitative analysis indicated that aptitude P was important in job duties. ~~Aptitude Q which~~

"Aptitude Q was included as a trial aptitude even though it had been rated irrelevant based upon (1) the strong statistical evidence for inclusion of the aptitude, (2) the obvious importance of perception, and (3) a recognition of the possibility that aptitude raters were influenced by the name of the aptitude rather than a knowledge of the types of jobs in which Aptitude Q has proven useful."

~~irrelevant in performing job duties~~. With employed workers a relatively high mean score or a relatively low standard deviation may indicate some sample preselection.

TABLE 3

Qualitative Analysis

(Based on the job analysis, the aptitudes indicated appear to be important to the work performed)

Aptitudes	Rationale
P - Form Perception	Required to locate broken ends, detect tangles, and ensure proper set-up for traveling knotter.
F - Finger Dexterity	Required in manipulating thread ends.
M - Manual Dexterity	Required to handle yarn packages, sleeves, and bobbins.

TABLE 4

Means, Standard Deviations (SD), Ranges and Pearson Product-Moment Correlations with the Criterion (r) for the Aptitudes of the GATB; N=52.

	Mean	SD	Range	r
G - General Learning Ability	78.9	15.1	55-118	.129
V - Verbal Aptitude	82.4	12.2	63-131	-.058
N - Numerical Aptitude	78.2	18.0	40-109	.157
S - Spatial Aptitude	84.1	14.8	61-124	.184
P - Form Perception	85.1	21.4	39-131	.168
Q - Clerical Perception	93.6	15.5	70-135	.298*
K - Motor Coordination	83.6	16.1	53-115	.236
F - Finger Dexterity	83.3	21.3	41-133	.106
M - Manual Dexterity	88.0	20.8	29-126	.278*

*Significant at the .05 level

TABLE 5

Summary of Qualitative and Quantitative Data

Type of Evidence	Aptitudes								
	G	V	N	S	P	Q	K	F	M
Job Analysis Data									
Important					X			X	X
Irrelevant						0			
Relatively High Mean				X	X	X			
Relatively Low Standard Dev.		X		X					
Significant Correlation with Criterion						X			X
Aptitudes to be Considered for Trial Norms				S	P				M

DERIVATION AND VALIDITY OF NORMS

Final norms were derived on the basis of the degree to which trial norms consisting of various combinations of Aptitudes S, P and M at trial cutting scores were able to differentiate between 69% of the sample considered to be good workers and 31% of the sample considered to be poor workers. Trial cutting scores at five-point intervals approximately one standard deviation below the mean are tried because this will eliminate about one-third of the sample with three-aptitude norms, For two-aptitude trial norms, minimum cutting scores of slightly more than one standard deviation below the mean will eliminate about one-third of the sample. For four-aptitude trial norms, cutting scores of slightly less than one standard deviation below the mean will eliminate about one-third of the sample. The Phi Coefficient was used as a basis for comparing trial norms. The optimum differentiation for the occupation of Spooler Operator, Automatic (textile) 689.886-054 was provided by the norms of S-65, P-65 and Q-85. The validity of these norms is shown in Table 6 and is indicated by a Phi Coefficient of .35 (statistically significant at the .01 level).

TABLE 6

Concurrent Validity of Trial Norms
S-65, P-65, Q-85

	Nonqualifying Test Scores	Qualifying Test Scores	Total
Good Workers	8	28	36
Poor Workers	10	6	16
Total	18	34	52

Phi Coefficient = .35 Chi Square (X^2_y) = 6.3
Significance Level = P/2 < .01

DETERMINIATION OF OCCUPATIONAL APTITUDE PATTERN

The data for this study did not meet the requirements for incorporating the occupation studied into any of the 36 OAP's included in Section II of the Manual for the General Aptitude Test Battery. The data for this sample will be considered for future grouping of occupations in the development of new occupational aptitude patterns.

DESCRIPTIVE RATING SCALE
(For Aptitude Test Development Studies)

Score____

RATING SCALE FOR _____
D. O. T. Title and Code

Directions: Please read Form SP-20, "Suggestions to Raters", and then fill in the items listed below. In making your ratings, only one box should be checked for each question.

Name of Worker (print) _____
(Last) (First)

Sex: Male_____ Female_____

Company Job Title: _____

How often do you see this worker in a work situation?

☐ See him at work all the time.

☐ See him at work several times a day.

☐ See him at work several times a week.

☐ Seldom see him in work situation.

How long have you worked with him?

☐ Under one month.

☐ One to two months.

☐ Three to five months.

☐ Six months or more.

A. How much work can he get done? (Worker's ability to make efficient use of his time and to work at high speed.)

☐ 1. Capable of very low work output. Can perform only at an unsatisfactory pace.

☐ 2. Capable of low work output. Can perform at a slow pace.

☐ 3. Capable of fair work output. Can perform at an acceptable but not a fast pace.

☐ 4. Capable of high work output. Can perform at a fast pace.

☐ 5. Capable of very high work output. Can perform at an unusually fast pace.

B. How good is the quality of his work? (Worker's ability to do high-grade work which meets quality standards.)

☐ 1. Performance is inferior and almost never meets minimum quality standards.

☐ 2. The grade of his work could stand improvement. Performance is usually acceptable but somewhat inferior in quality.

☐ 3. Performance is acceptable but usually not superior in quality.

☐ 4. Performance is usually superior in quality.

☐ 5. Performance is almost always of the highest quality.

C. How accurate is he in his work? (Worker's ability to avoid making mistakes.)

☐ 1. Makes very many mistakes. Work needs constant checking.

☐ 2. Makes frequent mistakes. Work needs more checking than is desirable.

☐ 3. Makes mistakes occasionally. Work needs only normal checking.

☐ 4. Makes few mistakes. Work seldom needs checking.

☐ 5. Rarely makes a mistake. Work almost never needs checking.

D. How much does he know about his job? (Worker's understanding of the principles, equipment, materials and methods that have to do directly or indirectly with his work.)

☐ 1. Has very limited knowledge. Does not know enough to do his job adequately.

☐ 2. Has little knowledge. Knows enough to "get by."

☐ 3. Has moderate amount of knowledge. Knows enough to do fair work.

☐ 4. Has broad knowledge. Knows enough to do good work.

☐ 5. Has complete knowledge. Knows his job thoroughly.

E. How much aptitude or facility does he have for this kind of work? (Worker's adeptness or knack for performing his job easily and well.)

☐ 1. Has great difficulty doing his job. Not at all suited to this kind of work.

☐ 2. Usually has some difficulty doing his job. Not too well suited to this kind of work.

☐ 3. Does his job without too much difficulty. Fairly well suited to this kind of work.

☐ 4. Usually does his job without difficulty. Well suited to this kind of work.

☐ 5. Does his job with great ease. Exceptionally well suited for this kind of work.

F. How large a variety of job duties can he perform efficiently? (Worker's ability to handle several different operations in his work.)

☐ 1. Cannot perform different operations adequately.

☐ 2. Can perform a limited number of different operations efficiently.

☐ 3. Can perform several different operations with reasonable efficiency.

☐ 4. Can perform many different operations efficiently.

☐ 5. Can perform an unusually large variety of different operations efficiently.

G. How resourceful is he when something different comes up or something out of the ordinary occurs? (Worker's ability to apply what he already knows to a new situation.)

☐ 1. Almost never is able to figure out what to do. Needs help on even minor problems.

☐ 2. Often has difficulty handling new situations. Needs help on all but simple problems.

☐ 3. Sometimes knows what to do, sometimes doesn't. Can deal with problems that are not too complex.

☐ 4. Usually able to handle new situations. Needs help on only complex problems.

☐ 5. Practically always figures out what to do himself. Rarely needs help, even on complex problems.

H. How many practical suggestions does he make for doing things in better ways? (Worker's ability to improve work methods.)

☐ 1. Sticks strictly with the routine. Contributes nothing in the way of practical suggestions.

☐ 2. Slow to see new ways to improve methods. Contributes few practical suggestions.

☐ 3. Neither quick nor slow to see new ways to improve methods. Contributes some practical suggestions.

☐ 4. Quick to see new ways to improve methods. Contributes more than his share of practical suggestions.

☐ 5. Extremely alert to see new ways to improve methods. Contributes an unusually large number of practical suggestions.

I. Considering all the factors already rated, and only these factors, how acceptable is his work? (Worker's "all-around" ability to do his job.)

☐ 1. Would be better off without him. Performance usually not acceptable.

☐ 2. Of limited value to the organization. Performance somewhat inferior.

☐ 3. A fairly proficient worker. Performance generally acceptable.

☐ 4. A valuable worker. Performance usually superior.

☐ 5. An unusually competent worker. Performance almost always top notch.

December 1968 S-427

FACT SHEET

Job Title: Spooler Operator, Automatic (textile) 689.886-054

Job Summary:

Tends a spooling machine, equipped with an automatic knotter that ties yarn ends from bobbins to starters, to wind yarn onto sleeves to form cheeses.

Work Performed:

Removes full bobbins of yarn from yarn trough, locates yarn end and unwinds yarn from bobbin until end reaches center of bobbin to prevent yarn breaks when traveling knotter swings cheese arm and core to winding drum. Places bobbin into spooler pocket and pulls end of yarn into thread clamp for traveling knotter moving on monorail to pick up and tie with yarn end of starter. Pushes cart on tracks to yarn supply table. Slides or lifts and places tridents with starters onto cart preparatory to creeling cores of cheese arms. Pushes cart along side of automatic spooler, removes full cheeses from cores of cheese arms when knotter ejects cheese arms from winding position, and places cheeses on tridents. Places starters from tridents over empty core of cheese arms to creel cores. Pushes cart with full tridents to yarn supply table. Pushes tridents from cart onto supply table or lifts and places tridents on table. Removes bobbins containing yarn from bobbin pan as they are rejected from spooler pockets. Examines yarn on bobbin to determine if yarn is tangled. Places bobbins with tangled yarn into container for Tangle Hand and bobbins with untangled yarn in yarn trough for winding yarn onto cheeses.

Effectiveness of Norms:

Only 69% of the nontest-selected workers used for this study were good workers; if the workers had been test-selected with the S-427 norms, ~~42%~~ 82% would have been good workers. 31% of the nontest-selected workers used for this study were poor workers; if the workers had been test-selected with the S-427 norms, only 18% would have been poor workers.

Applicability of S-427 Norms:

The aptitude test battery is applicable to jobs which include a majority of the duties described above.

GPO 868-074

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